United States Department of Agriculture
Forest Service
Research Note NE-302
1981

Growth of Hybrid Poplars in Pennsylvania and Maryland Clonal Tests

Maurice E. Demeritt, Jr.

Abstract. Average 4-year-height of 199 hybrid poplar clones ranged from 5.1 to 26.0 feet in Pennsylvania and 5.6 to 22.7 feet in Maryland. Several rapid-growing clones grew well at both locations, but height growth was affected by interactions of clones and location. The clones that grew best on both sites averaged 4 to 6 feet of height growth per year.

Poplar culture began in the United States in 1784 when the Lombardy poplar (*Populus nigra* L. cv. 'Italica', was introduced (Rehder 1954). Since then commercial nurseries have widely distributed Lombardy poplar and a few European hybrids. They have been used mainly for amenity plantings.

Artificial hybridization with poplars in the United States was initiated in the spring of 1924 by the Oxford Paper Company, now Boise Cascade Paper Group, Rumford, Maine, in cooperation with the New York Botanical Garden. Inter- and intra-specific crosses were made from collections of poplars planted at the New York Botanical Garden, New York City, and at Highland Park, Rochester, New York; wild trees of *Populus deltoides* Bart. growing on the grounds of the New York State Experimental Station at Geneva, New York, were also used (Stout and Schreiner 1933, Stout et al. 1927). Breeding was done during 1925, 1926, and 1927 and about 13,000 seedlings grew from about 100 full-sib cross combinations between different poplar species, varieties, and clones. To date, 219 of the trees from this hybridization study have been selected for clonal propagation and testing. The USDA Forest Service, Northeastern Forest Experiment Station, is currently testing 199 of these poplar clones—158 clones from Stout and Schreiner's hybridization study, and 41 clones from Canada and European selections.

This report evaluates the 4-year height growth of 199 hybrid poplar clones planted on two sites, one in Pennsylvania and the other in Maryland.

The rapid height growth of hybrid poplars in this region is of interest to people who are looking for a means of producing a large biomass volume in a short period of time whether it be for fiber, energy, or amenity use. A list of suppliers of rooted cuttings and cuttings of hybrid poplars may be obtained from your local County Extension Service or from the author, upon request.

Methods and Materials

The Ephrata, Pennsylvania, and Hampstead, Maryland, clonal tests were established with 10-inch dormant cuttings on agricultural sites that had been plowed and disced in the spring of 1974. The Pennsylvania site is quite level and had been used for growing corn for many years before the establishment of hybrid poplars. The Maryland site is on a very slight slope and had been used for growing corn or grass before the establishment of hybrid poplars, and grass had been the most recent crop. The design at each planting location consisted of five replications of 199 clonal four-tree plots; each plot consisting of two rows of two trees at a 6 x 6 foot spacing. Each plantation was either rototilled or disced between rows three to five times the first year after planting to control weeds. Height of every tree at each location was measured after the fourth growing season. Differences in 4-year mean height in clonal plots were analyzed with analyses of variance at each location. A separate analysis of variance was used to evaluate the effects of clone and location for 45 clones that were present in all five blocks at each location.

Results and Discussion

Average 4-year-height of the 199 clones ranged from 5.1 to 26.0 feet in Pennsylvania and 5.6 to 22.7 feet in Maryland. Four-year clonal heights differed significantly between locations, but there were significant differences in height among clones at both locations. There was also a significant interaction of clones and location for the 45 clones evaluated. Twelve clones ranked in the upper 12.5 percentile for 4-year-height at both locations (Table 1) and grew at the rate of 4 to 6 feet per year. Hybrid poplars growing on a reclaimed strip mine in Pennsylvania have maintained an average growth rate of 4 feet per year and have reached 65 feet in height after 16 growing seasons (Davidson 1979). Four of the six clones—NE-17, 19, 20, and 308—that ranked within the upper 25 percent of clones for 2-year-height at three locations in a previous study (Demeritt 1979) were also among the tallest after 4 years in this study. The two other clones—NE-21 and NE-351—in the previous study still rank within the upper 25 percent of all clones in this study.

Significant differences in height growth between clones indicate that superior clones can be selected for use at particular locations, but extreme caution should be exercised by extrapolating results because of the interactions of clones and location. There is some evidence, though, that a few clones do well at more than one location after 2 years (Demeritt 1979) and 4 years (Table 1).

Although early measurements of height at 1 and 4 years are of limited value in predicting future performance of hybrid poplar (Wilkinson 1973), there is some evidence in this and a previous report (Demeritt 1979) that certain clones do well at a number of locations. However, as a general rule, 1- to 4-year-heights are not well correlated with 15-year-heights on an individual tree, plot, or clone basis. Four-year data predict performance of clones up to about age 8.

Literature Cited

Davidson, Walter H.
1979. Hybrid poplar pulpwood and lumber from a reclaimed strip-mine. USDA For. Serv. Res. Note NE-232. 2 p.

Demeritt, Maurice E., Jr.
1979. Evaluation of early growth among hybrid poplar clonal tests in the Northeastern United States. *In* Proc. 26th Northeast. For. Tree Improv. Conf. p. 133-139.

Rehder, Alfred.
1954. Manual of cultivated trees and shrubs. 2nd ed., rev. The Macmillan Company, New York. 996 p.

Stout, A. B., Ralph H. McKee, and E. J. Schreiner.
1927. The breeding of forest trees for pulpwood. Bot. Gard. 28:49-63.

Stout, A. B. and E. J. Schreiner.
1933. Results of a project in hybridizing poplars. J. Hered. 24:216-229.

Wilkinson, R. C.
1973. Inheritance and correlation of growth characters in hybrid poplar clones. *In* Proc. 20th Northeast. For. Tree Improv. Conf. p. 121-130.

MANUSCRIPT RECEIVED FOR PUBLICATION
30 OCTOBER 1980

Table 1.—Four-year-height, in feet, of the 12 tallest hybrid poplar clones in both the Pennsylvania and Maryland clonal tests

Clone ID	Parentage		Pennsylvania		Maryland	
	Female	Male	Height	Range	Height	Range
NE-11	P.cv. 'Charkoviensis' x P. deltoides		26.0	24-29	16.2	8-22
NE-17	P.cv. 'Charkoviensis' x P.cv. 'Caudina'		22.3	12-31	15.6	10-22
NE-19	P.cv. 'Charkoviensis' x P.cv. 'Caudina'		21.7	15-32	19.9	12-24
NE-20	P.cv. 'Charkoviensis' x P.cv. 'Caudina'		22.4	10-28	15.7	3-26
NE-41	P. maximowiczii x P. trichocarpa		20.9	15-27	15.6	9-19
NE-308	P.cv. 'Charkoviensis' x P.cv. 'Incrassata'		20.9	13-30	21.3	18-25
NE-310	P.cv. 'Charkoviensis' x P.cv. 'Caudina'		19.1	5-27	17.0	4-24
NE-316	P.cv. 'Charkoviensis' x P.cv. 'Robusta'		19.3	10-26	15.4	12-20
NE-359	P. deltoides x P.cv. 'Caudina'		22.2	17-27	16.1	10-21
NE-381	P.cv. 'Charkoviensis' x P.cv. 'Caudina'		20.2	12-25	17.9	14-22
DN-22	P. x euramericana cv. 'I-262'		20.7	17-24	19.1	13-26
I-45/51	P. euramericana, cv. 'I-45/51'		21.5	17-23	17.9	15-21

☆U.S GOVERNMENT PRINTING OFFICE: 1981-703-011/5